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(54) Title: MULTISPECTRAL, MULTIFUSION, LASER-POLARIMETRIC OPTICAL IMAGING SYSTEM

(57) Abstract: A multi-energy polarization imaging method consisting of a multi-fusion, dual-rotating retarder / multiple-energy complete Mueller matrix-based polarimeter and dual-energy capabilities, has been invented. The term multifusion describes the use of several imaging functions altogether such as polarimetric imaging, dual-energy subtraction, multifocal imaging and other. By substracting polarimetric parameters such as degree of polarization, degree of linear polarization, degree of circular polarization, respectively, obtained with interrogation light beams of wavelengths λ_1 and λ_2, he system, enhanced imaging is obtained. The system includes a light source for illuminating a target with a first quantity of light having a first wavelength and a second quantity of light having a second wavelength, the first and second wavelengths being different. A polarization-state generator generates a polarization state for each of the first and second quantities of light, and includes a first polarizer through which the first and second quantities of light are transmitted before entering a first waveplate. A polarization-state receiver evaluates a resulting polarization state of the first and second quantities of light following illumination of the target, the polarization-state receiver including a second waveplate through which the first and second quantittes of light are transmitted before entering a second polarizer. An optical image-capture device captures a first image of the target illuminated by the first quantity of light and a second image of the target illuminated by the second quantity of light. A processing unit assigns a weighting factor to at least one of the first and second images and evaluates a weighted difference between the first and second images to generate a multi-energy image of the target.

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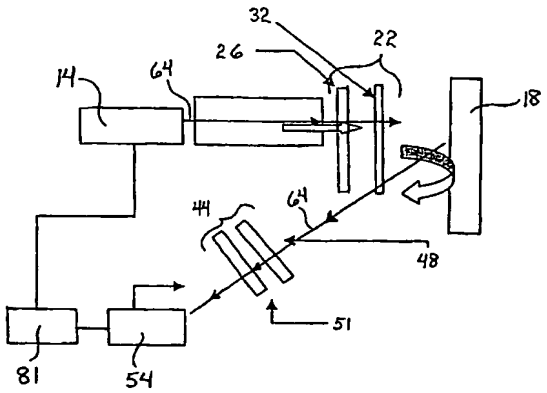

(57) Abstract: A multi-energy polarization imaging method consisting of a multi-fusion, dual-rotating retarder / multiple-energy complete Mueller matrix-based polarimeter and dual-energy capabilities The system includes a light source (14) for illuminating a target (18) with a first quantity of light having a first wavelength and a second quantity of light having a second wavelength, the first and second wavelength being different. A polarization-state generator (22) generates a polarization state for each of the first and second quantities of light, and includes a first polarizer (26) through which the first and second quantities of light are transmitted before entering a first waveplate (32). A polarization-state receiver (44) evaluates a resulting polarization state of the first and second quantities of light following illumination of the target (18), the polarization-state receiver (44) including a second waveplate (48) through which the first and second quantities of light are transmitted before entering a second polarizer (51). An optical image-capture device captures a first image of the target illuminated by the first quantity of light and a second image of the target illuminated by the second quantity of light. A processing unit assigns a weighting factor to at least one of the first and second images and evaluates a weighted difference between the first and second images to generate a multi-energy image of the target (18).

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